

FAST-TIME ANALYSIS SUPPORT FOR THE TERMINAL AREA PRECISION SCHEDULING AND SPACING (TAPSS) SIMULATION

Problem

Evaluating advanced scheduling concepts for NextGen involves understanding of a wide range of tradeoffs across an extensive parameter space. These parameters include scheduling buffer, arrival precision, and maximal allowed delays. Since actual concept development and associated human-in-the-loop (HITL) testing are costly, tools are needed to narrow down the specific parameter space to the most promising designs and evaluations.

Solution

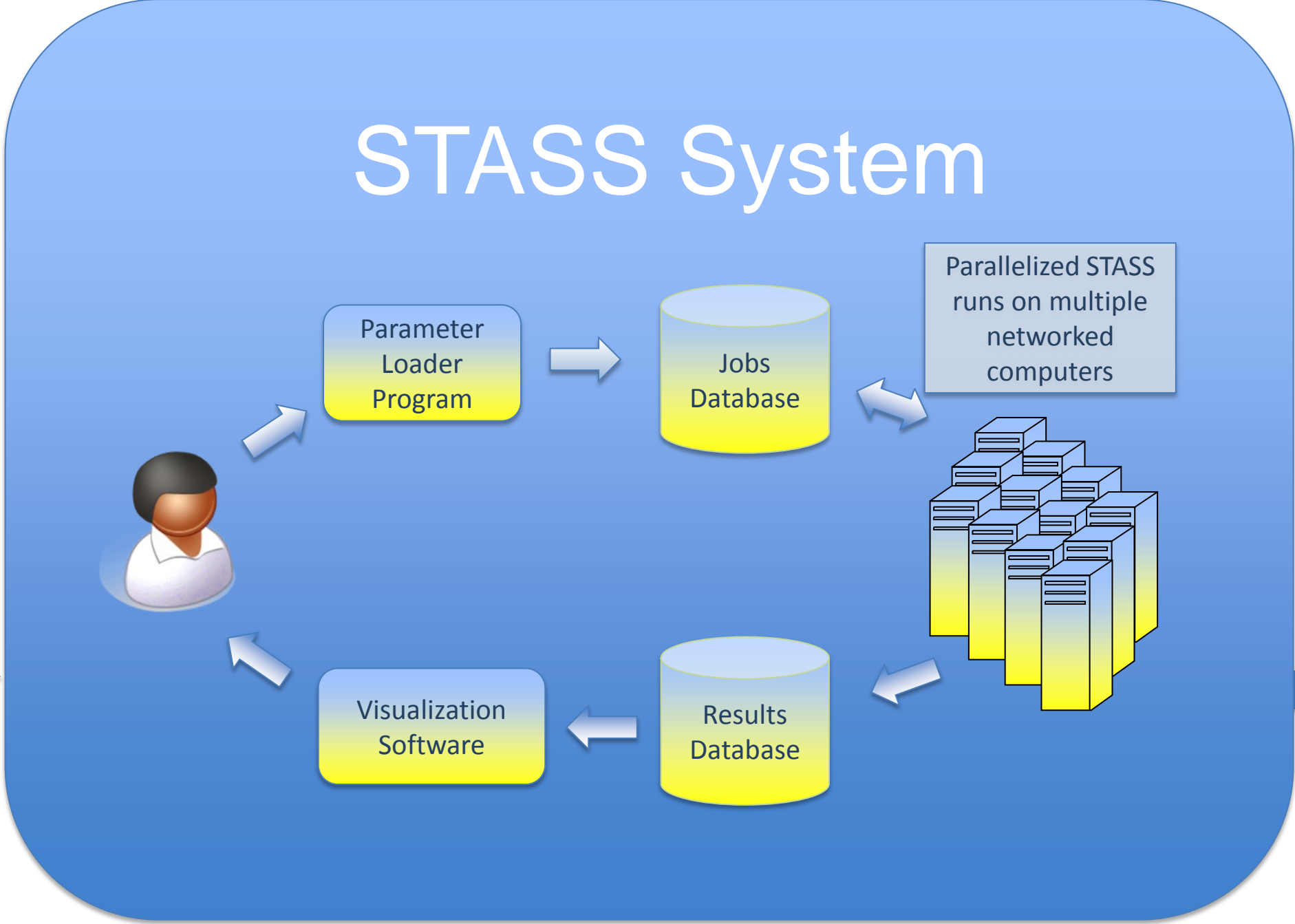
The Stochastic Terminal Area Scheduling Simulation System (**STASS**) provides a platform for fast-time simulation of advanced scheduling concepts. STASS models aircraft arrival system performance in the extended terminal area using a two-point scheduling approach. Design sweeps using Monte Carlo techniques explore the effects of varying technology performance (arrival uncertainty) at meter fix and runway locations across the extensive parameter space for optimal designs.

Key Parameters

- Meter fix uncertainty
- Runway uncertainty
- Meter fix buffer
- Runway buffer
- Maximum TRACON delay
- Time advance margin

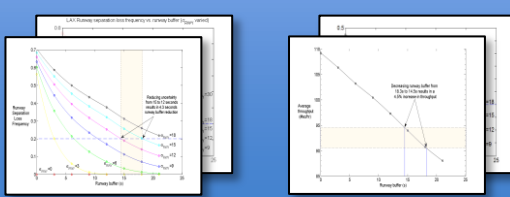
Key Metrics

- Average throughput
- TRACON delay
- Center delay
- Controller workload
- Time advance savings



Key relationships between buffer, uncertainty, and controller workload

Theoretical Trade Space Analysis



Large-scale evaluation over wide parameter value range

Acceptable levels of controller workload under TAPSS conditions

Ground-Based HITL (TAPSS)

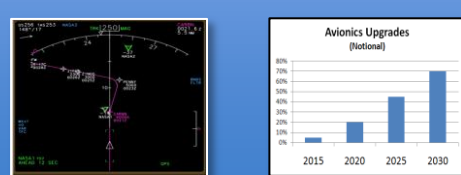
Concepts: advanced TMA, EDA and CMS



System performance and technology expectations for various buffering, workload, and precision scenarios

Air/Ground-Based HITL (Future)

Additional concepts: interval management, avionics upgrades



Expected performance gains from reduced arrival uncertainty by airborne technology and varying avionics upgrade levels